Patterns of concurrent substance use among nonmedical ADHD stimulant users: Results from the National Survey on Drug Use and Health☆

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ARTICLE INFO

ABSTRACT

Aims: To examine patterns of concurrent substance use among adults with nonmedical ADHD stimulant use.

Methods: We used latent class analysis (LCA) to examine patterns of past-year problematic substance use (meeting any criteria for abuse or dependence) in a sample of 6103 adult participants from the National Surveys on Drug Use and Health 2006–2011 who reported past-year nonmedical use of ADHD stimulants. Multivariable latent regression was used to assess the association of socio-demographic characteristics, mental health and behavioral problems with the latent classes.

Results: A four-class model had the best model fit, including (1) participants with low probabilities for any problematic substance use (*Low substance class*, 53.3%); (2) problematic users of all types of prescription drugs (*Prescription drug class*, 13.3%); (3) participants with high probabilities of problematic alcohol and marijuana use (*Alcohol–marijuana class*, 28.8%); and (4) those with high probabilities of problematic use of multiple drugs and alcohol (*Multiple substance class*, 4.6%). Participants in the 4 classes had distinct socio-demographic, mental health and service use profiles with those in the *Multiple substance class* being more likely to report mental health and behavioral problems and service use.

Conclusion: Nonmedical users of ADHD stimulants are a heterogeneous group with a large subgroup with low prevalence of problematic use of other substances. These subgroups have distinct patterns of mental health comorbidity, behavior problems and service use, with implications for prevention and treatment of nonmedical stimulant use.

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1. Introduction

Prescription stimulants, commonly prescribed for treatment of Attention Deficit Hyperactivity Disorder (ADHD), are classified as schedule II based on the Controlled Substances Act (CSA) due to the high abuse potential (Drug Enforcement Administration, 2003). Nonmedical use of these stimulants is a growing problem especially among young adults (Johnston et al., 2003; McCabe et al., 2005, 2007b; SAMHSA, 2009a; Teter et al., 2005, 2006; White et al., 2006). Furthermore, nonmedical use of these stimulants is associated with higher odds of other substance use or deviant behaviors (McCabe et al., 2005; McCabe, 2008; SAMHSA, 2009a; Teter et al., 2005).

While prior research compared nonmedical ADHD stimulant users to non-users regarding substance comorbidities or risky behaviors (Arria et al., 2008; McCabe et al., 2007a, 2005; SAMHSA, 2009a; Teter et al., 2006; White et al., 2006), it is not clear whether distinct subgroups of nonmedical ADHD stimulant users can be identified based on their concurrent substance use patterns. It is
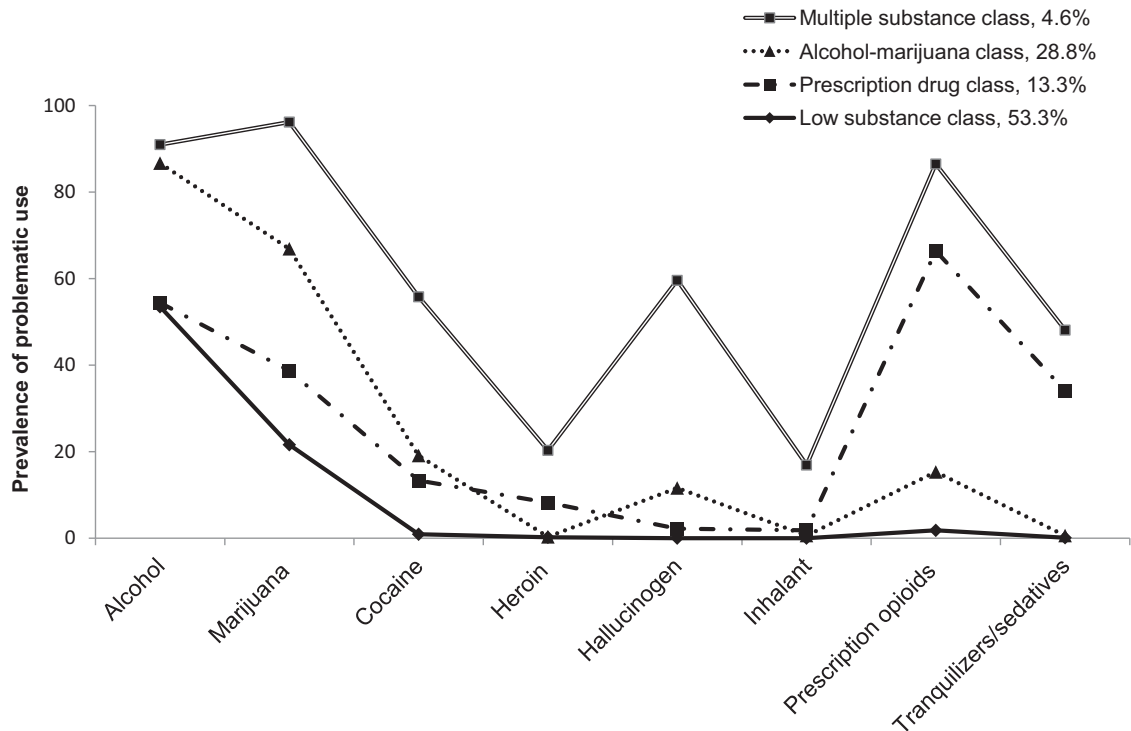
Fig. 1. Prevalence of problematic substances use among 6103 participants of 2006–2011 National Survey on Drug Use and Health with past-year nonmedical ADHD stimulant use categorized according to classes identified through latent class analysis.

also not clear whether any heterogeneity in concurrent use of other substances would be reflected in mental health and behavioral profiles of these individuals. While concurrent use of more than one substance has been found to be associated with more severe physical and psychological consequences (Conway et al., 2003; Hedden et al., 2009; Kandel et al., 2001), the psychological and social correlates of multiple substance use among nonmedical ADHD stimulant users has not been previously examined.

This study aimed to first identify heterogeneous subgroups among nonmedical ADHD stimulant users by examining their concurrent problematic substance use patterns (defined as meeting any criteria for abuse or dependence), including alcohol and illegal drugs, using latent class analysis. Second, we examined the socio-demographic, psychological and social characteristics of these subgroups. We hypothesized that the class with greater concurrent problematic substance use would have more severe psychological and social problems.

2. Methods

2.1. Study sample and measures

Data were drawn from the combined 2006–2011 NSDUH data. The sample was restricted to adult participants (aged 18 or older) who reported using ADHD stimulants nonmedically in the past year ($N = 6103$). The NSDUH is an annual cross-sectional survey sponsored by the Substance Abuse and Mental Health Administration (SAMHSA) and is designed to provide estimates of the prevalence of alcohol and drug use in the household population of the United States, 12 years of age and older. The response rate for household screening ranged from 87% to 91% and for completed interviews from 74% to 76% across the 6 years. Survey items were administered by Computer-assisted personal interviewing (CAPI) and audio computer-assisted self-interviewing (ACASI). Detailed information about the survey methodology of the NSDUH are found elsewhere (SAMHSA, 2007, 2008, 2009b, 2010, 2011, 2012).

2.1.1. Assessment of past-year nonmedical ADHD stimulant use. ADHD stimulants included in this study were Ritalin® or methylphenidate, Cylert®, Dexedrine®, Dextroamphetamine, Adderall®, and Vyvanse®. The survey used the following question to assess nonmedical use of ADHD stimulants in the lifetime: "Have you ever, even

once, used [Drug name] that was not prescribed for you or that you took only for the experience or feeling it caused?" Those who reported last time use within the prior 12 months were defined as past-year nonmedical ADHD stimulant users.

2.1.2. Past-year problematic substances use. Past-year problematic substance use was defined by fulfilling any criteria for substance abuse or dependence based on the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria (American Psychiatric Association, 1994). The substances examined included alcohol, marijuana, cocaine, heroin, hallucinogens, inhalants, and prescription opioids, and prescription tranquilizers/sedatives (combined).

2.1.3. Socio-demographic measures. Socio-demographic variables included in the analyses were gender, age (18–25, ≥26 years), race/ethnicity (non-Hispanic white, racial/ethnic minority), marital status (married, no longer married, never married), employment status (partial or full employment, unemployed, not in the labor force), education (less than high school, high school, college and above), annual household income (≤$19,999, $20,000–$34,999, $35,000–$69,999, ≥$70,000).

2.1.4. Past-year mental health and behavioral problems. Mental health variables included were past-year clinician-identified anxiety disorder or depression, and self-reported serious psychological distress (SPD). SPD was ascertained if a score based on the K6 measure was 13 or greater (Kessler et al., 2003). The use of mental health and substance abuse services was ascertained by asking participants whether they received any mental health treatment or substance abuse treatment in the past year. Past-year behavioral problems were ascertained by asking participants how many times they had attacked someone, sold drugs and stolen anything worth more than $50 over the year. Consistent with past research (Chen et al., 2014), participants who reported any of the three behaviors were categorized as having a behavioral problem (0 for none and 1 for engaging in one or more of these behaviors). Past-year arrest was assessed in a similar fashion by asking how many times the participants had been arrested and charged with breaking the law (0 for none and 1 for at least once). Sexually transmitted diseases (STD) were also assessed by participant self-reports of diagnosis by a clinician.

2.2. Statistical analyses

Complex latent class analysis (LCA) was used to identify subgroups according to concurrent problematic substance use among past-year nonmedical ADHD stimulant users using *Mplus* software (Muthén and Muthén, 1998-2010). LCA for 1–6 classes were performed and fit indices were compared. Bayesian Information Criterion (BIC) was given priority over the other fit statistics such as Akaikes Information Criterion (AIC) and Sample Size Adjusted BIC (ABIC) given its more